

CLAIMS

What is claimed is:

1. A drift compensation system for compensating the drift of a sensor within a manufacturing lot, comprising:

a sensor test sample manufactured from a lot of material having substantially similar chemical or metallurgical properties;

a drift characterization tester, wherein the test sample is exposed to a predetermined thermal environment, and wherein measurements of the test sample output are analyzed to provide a functional relationship between temperature and time associated with the sensor test sample;

a drift function describing the relationship between time and temperature derived from the thermal exposure testing of the test sample in the drift characterization tester;

a sensor system comprising:

a second sensor manufactured from the same lot of material as the sensor test sample; and

a memory storage component for storing parameters associated with the drift function of the sensor test sample and the second sensor;

a drift compensation instrument coupleable to the second sensor, and operable to retrieve the stored parameters of the drift function from the memory storage component and correct the output of the second sensor based on the drift function; and

wherein the sensor test sample is exposed to the predetermined thermal environment in the drift characterization tester to characterize the drift function that is used by the drift compensation instrument to compensate the output drift of the sensors manufactured from the same lot of material.

2. The drift compensation system of claim 1, further comprising an expected thermal exposure input for the sensor lot, comprising an estimated temperature and time of thermal exposure of the sensor lot.

3. The drift compensation system of claim 1, wherein the thermal exposure comprises a predetermined temperature for a predetermined time.

4. The drift compensation system of claim 1, wherein the test sample and second sensors are thermocouples.

5. The drift compensation system of claim 1, wherein the test sample and second sensors comprise one of a resistance temperature detector, a thermistor, a diode, and a transistor.

6. The drift compensation system of claim 1, wherein the test sample and second sensors comprise one of a pressure sensor, a humidity sensor, a chemical sensor, and a flow sensor.

7. The drift compensation system of claim 1, wherein the memory storage component of the sensor system comprises one of an EPROM, an EEPROM, a barcode, an RFID tag, a virtual storage location on a network, a memory device, a computer readable medium, and a computer disk.

8. The drift compensation system of claim 1, wherein the drift characterization tester, comprises:

a sensor test sample to be characterized;

a thermal test chamber for exposing the test sample to a predetermined temperature for a predetermined time;

a measuring component for reading the output of the test sample as a function of temperature and time;

a drift analyzer having a local memory storage capability for storage of sensor output data as a function of temperature and time, operable to analyze the data and characterize a drift function, and having a drift macro operable to determine a set of drift function parameters associated with the drift function; and

wherein the drift characterization tester is operable to output to a memory storage component associated with a second sensor the parameters associated with the drift function from the characterization of the sensor test sample.

9. The drift compensation system of claim 1, wherein the drift compensation instrument comprises:

- an input portion coupleable to the memory storage component, and operable to retrieve the stored parameters of the drift function from the memory storage component;

- a measurement portion coupleable to the second sensor for measuring the present output of the sensor before compensation for drift and providing measurement data to a processor portion;

- the processor portion operable to use the parameters associated with the drift function and the present output of the sensor, and correct the output measurements of the second sensor based on the parameters;

- a local memory portion for storing present measurements, the parameters and other values necessary for compensating the sensor measurements associated with drift;

- an output portion for supplying the compensated output of the sensor to an external device; and

- wherein coupleable to the second sensor, and operable to retrieve the stored parameters of the drift function from the memory storage component and correct the present output of the second sensor based on the drift function.

10. The drift compensation system of claim 1, wherein the thermal exposure comprises a plurality of predetermined temperatures over a predetermined period of time.

11. The drift compensation system of claim 1, wherein the compensation for the drift comprises a correction to one of an indicated temperature value with respect to drift.

12. A measurement system for compensating the drift of a sensor within a manufactured lot of sensors, comprising:

- a sensor test sample manufactured from a lot of material having substantially similar chemical or metallurgical properties;
- an expected thermal exposure input for the sensor lot, comprising an exposure to an expected temperature and time;
- a drift characterization tester, wherein the test sample is exposed to the expected temperature for the expected time;
- a drift function describing the relationship between time and temperature derived from the thermal exposure testing of the test sample;
- a memory storage component for storing parameters corresponding to the drift of the sensor test sample and a second sensor manufactured from the same lot of material;
- a drift compensation instrument coupleable to the second sensor of the sensor lot, and operable to retrieve the stored parameters of the drift function from the memory storage component and correct the output of the second sensor based on the drift function; and
- wherein the sensor test sample is exposed to the expected thermal environment in the drift characterization tester to characterize the drift function that is used by the drift compensation instrument to compensate the output drift of the second sensor manufactured from the same lot of material.

13. The measurement system of claim 12, further comprising an expected thermal exposure input for the sensor lot, comprising an estimated temperature and time of thermal exposure of the sensor lot.

14. The measurement system of claim 12, wherein the expected thermal exposure comprises a predetermined temperature for a predetermined time.

15. The measurement system of claim 12, wherein the thermal exposure comprises a plurality of predetermined temperatures for one of a plurality of predetermined times.

16. The measurement system of claim 12, wherein the test sample and second sensor are thermocouples.

17. The measurement system of claim 12, wherein the test sample and second sensor comprise one of a resistance temperature detector, a thermistor, a diode, and a transistor.

18. The measurement system of claim 12, wherein the test sample and second sensor comprise one of a pressure sensor, a humidity sensor, a chemical sensor, and a flow sensor.

19. The measurement system of claim 12, wherein the memory storage component of the sensor system comprises one of an EPROM, an EEPROM, a barcode, an RFID tag, a virtual storage location on a network, a memory device, a computer readable medium, and a computer disk.

20. The measurement system of claim 12, wherein the drift characterization tester, comprises:

- a sensor test sample to be characterized;

- a thermal test chamber for exposing the test sample to a predetermined temperature for a predetermined time;

- a measuring component for reading the output of the test sample as a function of temperature and time;

- a drift analyzer having a local memory storage capability for storage of sensor output data as a function of temperature and time, operable to analyze the data and characterize a drift function, and having a drift macro operable to determine a set of drift function parameters associated with the drift function; and

wherein the drift characterization tester is operable to output to a memory storage component associated with a second sensor the parameters associated with the drift function from the characterization of the sensor test sample.

21. The measurement system of claim 12, wherein the drift compensation instrument comprises:

- an input portion coupleable to the memory storage component, and operable to retrieve the stored parameters of the drift function from the memory storage component;

- a measurement portion coupleable to the second sensor for measuring the present output of the sensor before compensation for drift and providing measurement data to a processor portion;

- the processor portion operable to use the parameters associated with the drift function and the present output of the sensor, and correct the output measurements of the second sensor based on the parameters;

- a local memory portion for storing present measurements, the parameters and other values necessary for compensating the sensor measurements associated with drift;

- an output portion for supplying the compensated output of the sensor to an external device; and

- wherein coupleable to the second sensor, and operable to retrieve the stored parameters of the drift function from the memory storage component and correct the present output of the second sensor based on the drift function.

22. A method of compensating for the drift of a sensor in a measurement system comprising a sensor test sample manufactured from a lot of material having substantially similar chemical or metallurgical properties, a drift characterization tester, a drift function, a sensor system comprising a second sensor manufactured from the same lot of material as the sensor test sample, and a memory storage component, and a drift compensation instrument, the method comprising:

exposing a sensor test sample to a predetermined thermal environment in the drift characterization tester;

measuring the output of the sensor as a function of temperature and time;

characterizing and storing a drift function for the sensor, wherein the drift function describes the relationship between time and temperature derived from the thermal exposure temperature and time measurements of the test sample;

storing parameters associated with the drift function in the memory storage component of the sensor system;

inputting the parameters associated with the drift function to the drift compensation instrument, and use the parameters to compensate the output drift of the second sensor; and

wherein the sensor test sample is exposed to the predetermined thermal environment in the drift characterization tester to characterize the drift function used by the drift compensation instrument to compensate the output drift of the second sensor manufactured from the same lot of material.

23. The drift compensation method of claim 22, wherein the parameters associated with the drift function are used for constructing a drift compensation function operable to compensate the output drift of the second sensor.

24. The drift compensation method of claim 23, wherein the parameters associated with the drift function are fitted data coefficients of a math function.

25. The drift compensation method of claim 23, wherein the parameters associated with the drift function are a two dimensional matrix of the measurement data from the sensor test sample characterization.

26. The drift compensation method of claim 23, wherein the parameters associated with the drift function are fitted data coefficients of a plurality of math functions associated with a plurality of segments of the drift function.

27. The drift compensation method of claim 22, wherein the characterizing and storing a drift function for the sensor comprises analyzing the measurement outputs of the test sample and deriving a drift function based on the relationship of the temperature and time associated with the drift of the test sample, and storing parameters associated with the drift function.

28. The drift compensation method of claim 22, wherein the test sample and second sensors comprise one of a resistance temperature detector, a thermistor, a diode, and a transistor.

29. The drift compensation method of claim 22, wherein the test sample and second sensors comprise one of a pressure sensor, a humidity sensor, a chemical sensor, and a flow sensor.

30. The drift compensation method of claim 22, wherein the memory storage component of the sensor system comprises one of an EPROM, an EEPROM, a barcode, an RFID tag, a virtual storage location on a network, a memory device, a computer readable medium, and a computer disk.